In addition, a random access asynchronous communications system in which all the user stations' clocks are not controlled by base station is desirable because of its simplicity. That system, on the other hand, has a very strict requirement on the spread spectrum multiple access codes' characteristic. So, some embodiments of the present invention give an effective and practical method for such a random access asynchronous digital communications system.

The spread spectrum multiple access codes mentioned here are composed of basic pulses with normalized "1" amplitude and width and different polarities. The number of the basic pulses is determined according to such practical factors such as the number of required users, the number of available pulse compressing codes, the number of available orthogonal pulse compressing codes, the number of available orthogonal frequencies, system bandwidth, the system's highest transmission rate, etc. The intervals between the basic pulses on the time axis are all unequal and the basic pulses' positions on it are all different, which are both considered together with the basic pulses' polarities when coding.

Of all the values of the basic pulses' intervals mentioned above, only one is an odd number larger than the smallest interval's value, i.e. the coding length is odd, while the rest intervals' values are all even. Moreover,

any interval's value can not be the sum of any other two or more interval values.

According to orthogonality, the spread spectrum multiple access codes mentioned above are sorted into different code groups, in which the polarities of the basic pulses are determined by the orthogonality requirement and the sequence is sorted according to Hadamard or other orthogonal matrices, or some kind of bi-orthogonal or trans-orthogonal matrix.

The above coding method is a new CDMA spread spectrum multiple access coding scheme for a Large Area Asynchronous Wireless Communications System or Large Area Synchronous Wireless Communications System, and the code groups are named LA-CDMA codes. When doing correlation, whether it is auto-correlation or cross-correlation, and whether it is periodic correlation, or non-periodic correlation, or even mixed correlation, no two or more basic pulses can meet together besides at the origin, which ensures that the side-lobes' values are at most +1 or -1. Furthermore, there exists a zero correlation window beside the origin and the main-lobe's value equals the number of basic pulses. Therefore, the side-lobes of the auto-correlations and cross-correlations are controlled and reduced. That is, in the corresponding CDMA system, both MAI and ISI are controlled, and an ideal CDMA system without MAI and ISI

can also be realized if the zero correlation window is utilized.

The above principles lead to a new simpler, clearer and faster design scheme of spread spectrum multiple access codes for spread spectrum technology and digital multiple access technology. Based on the scheme, a CDMA system's design can be simplified and large capacity achieved, so as to solve the contradiction between the growing need for high capacity and the limited frequency resources.

Because the side-lobes of the correlations are small and smooth, MAI and ISI are unrelated to the users' access time and thus random access is permitted. Further, as long as the stability of the clocks in the user stations' transceivers meets a specific requirement, an asynchronous mode is also permitted.

In a practical design, to increase the code's duty ratio, the above mentioned basic pulse can also be formed by pulse compressing codes, which are composed of one or more binary or m-ary sequences, including frequency modulated sequences, or frequency and phase jointly modulated sequences, or frequency, phase and time jointly modulated sequences, etc.

In order to raise the transmission data rate or reduce frequency band-width, or increase the number of multiple access codes number, the codes can also be time offset and overlapped, where the shift interval should be larger than